

4-5

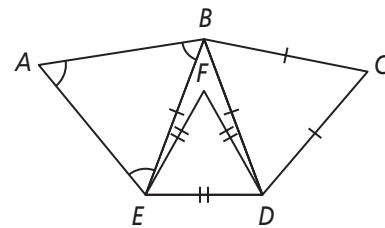
Practice

Form G

Isosceles and Equilateral Triangles

Complete each statement. Explain why it is true.

- $\angle DBC \cong \underline{\hspace{1cm}} \cong \angle CDB$
 $\angle BCD$; all the angles of an equilateral triangle are congruent.
- $\angle BED \cong \underline{\hspace{1cm}}$
 $\angle BDE$; the base angles of an isosceles triangle are congruent.
- $\angle FED \cong \underline{\hspace{1cm}} \cong \angle DFE$
 $\angle EDF$; all the angles of an equilateral triangle are congruent.
- $\overline{AB} \cong \underline{\hspace{1cm}} \cong \overline{BE}$
 \overline{EA} ; all the sides of an equilateral triangle are congruent.

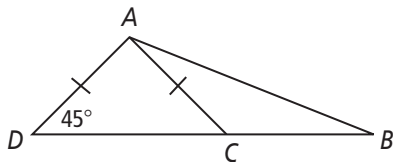


Algebra Find the values of x and y .

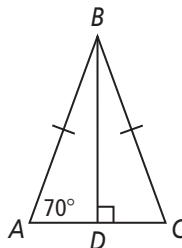
- 65; 50**
- 45; 90**
- 55; 70**
- 30; 20**
- 70; 20**
- 45; 45**

Use the properties of isosceles and equilateral triangles to find the measure of the indicated angle.

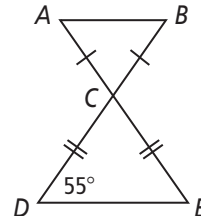
11. $m\angle ACB$ **135**



12. $m\angle DBC$ **20**



13. $m\angle ABC$ **55**



- Equilateral $\triangle ABC$ and isosceles $\triangle DBC$ share side BC . If $m\angle BDC = 34$ and $BD = BC$, what is the measure of $\angle ABD$? (Hint: it may help to draw the figure described.) **172**

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Practice (continued)

Form G

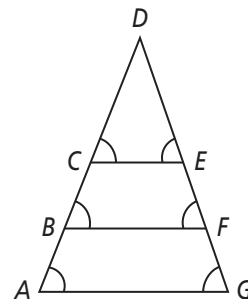
Isosceles and Equilateral Triangles

Use the diagram for Exercises 15–17 to complete each congruence statement. Explain why it is true.

15. $\overline{DF} \cong \underline{\hspace{1cm}} ?$ \overline{DB} ; Converse of the Isosceles Triangle Theorem

16. $\overline{DG} \cong \underline{\hspace{1cm}} ?$ \overline{DA} ; Converse of the Isosceles Triangle Theorem

17. $\overline{DC} \cong \underline{\hspace{1cm}} ?$ \overline{DE} ; Converse of the Isosceles Triangle Theorem

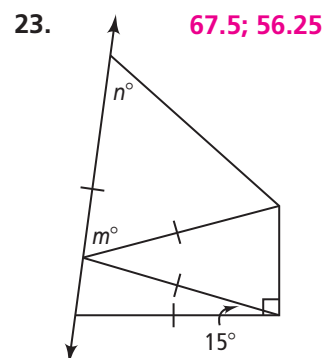
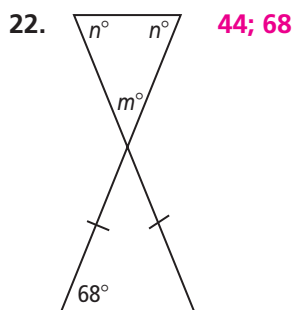
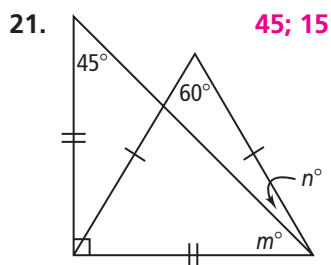


18. The wall at the front entrance to the Rock and Roll Hall of Fame and Museum in Cleveland, Ohio, is an isosceles triangle. The triangle has a vertex angle of 102. What is the measure of the base angles? **39**

19. **Reasoning** An exterior angle of an isosceles triangle has the measure 130. Find two possible sets of measures for the angles of the triangle.
50, 50, and 80; 50, 65, and 65

20. **Open-Ended** Draw a design that uses three equilateral triangles and two isosceles triangles. Label the vertices. List all the congruent sides and angles.
Check students' work.

Algebra Find the values of m and n .



24. **Writing** Explain how a corollary is related to a theorem. Use examples from this lesson in making your comparison.
A theorem is a statement that is proven true by a series of steps. A corollary is a statement that can be taken directly from the conclusion of a theorem, usually by applying the theorem to a specific situation. For example, Theorems 4-3 and 4-4 are general statements about all isosceles triangles. Their corollaries apply the theorems to equilateral triangles.

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Practice

Form K

Isosceles and Equilateral Triangles

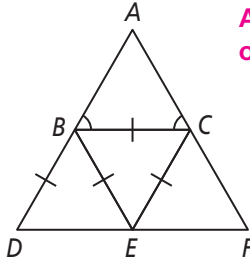
Complete each statement. Explain why it is true.

1. $\overline{AB} \cong \underline{\hspace{1cm}}$

2. $\angle BDE \cong \underline{\hspace{1cm}}$

3. $\angle CBE \cong \underline{\hspace{1cm}} \cong \angle BCE$

Answers may vary. Sample: $\angle BEC$; all the angles of an equilateral triangle are congruent.

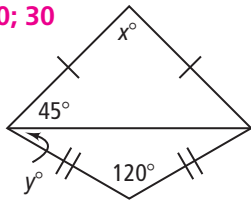


Answers may vary. Sample: \overline{AC} ; the legs of an isosceles triangle are congruent.

Answers may vary. Sample: $\angle BED$; the base angles of an isosceles triangle are congruent.

Algebra Find the values of x and y .

4. **90; 30**



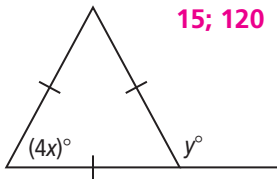
To start, determine what types of triangles are shown in the diagram. Then use an equation to find x .

Because two sides are marked congruent in both triangles, the triangles are both $\underline{\hspace{1cm}}$. **isosceles**

$$45 + \boxed{45} + x = \boxed{180}$$

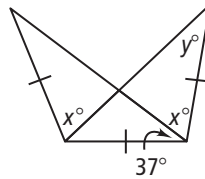
5.

15; 120



6.

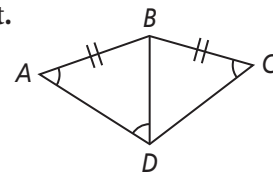
69; 37



Use the properties of isosceles triangles to complete each statement.

7. If $m\angle ADB = 54$, then $m\angle CBD = \underline{\hspace{1cm}}$. **72**

8. If $AB = 8$, then $BD = \underline{\hspace{1cm}}$. **8**



9. You are asked to put a V-shaped roof on a house. The slope of the roof is 40° . What is the measure of the angle needed at the vertex of the roof? **100**

10. **Reasoning** The measure of one angle of a triangle is 30. Of the two remaining angles, the larger angle is four times the size of the smaller angle. Is the triangle isosceles? Explain. **Yes, because the measure of the smaller angle is 30.**

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Practice (continued)

Form K

Isosceles and Equilateral Triangles

For Exercises 11 and 12, use the diagram to complete each congruence statement. Then list the theorem or corollary that proves the statement.

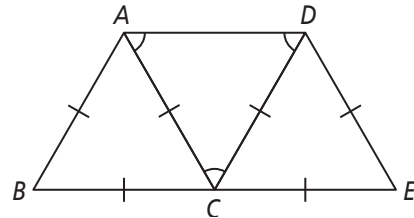
The first one has been done for you.

$$\angle B \cong ?$$

Answer: $\angle BAC$ (or $\angle ACB$); Corollary to Theorem 4-3

11. $\overline{AD} \cong ?$ Answers may vary. Sample: \overline{AC} or \overline{DC} ; Corollary to Theorem 4-4

12. $\angle E \cong ?$ Answers may vary. Sample: $\angle DCE$ or $\angle CDE$; Corollary to Theorem 4-3

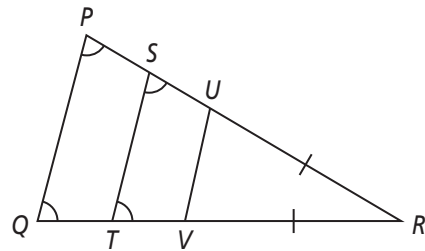


For Exercises 13–15, use the diagram to complete each congruence statement. Then list the theorem or corollary that proves the statement.

13. $\overline{PR} \cong ?$ \overline{QR} ; Converse of the Isosceles Triangle Theorem

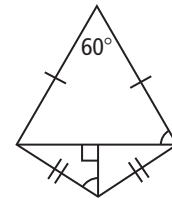
14. $\angle RUV \cong ?$ $\angle RVU$; Isosceles Triangle Theorem

15. $\overline{SR} \cong ?$ \overline{TR} ; Converse of the Isosceles Triangle Theorem



16. **Reasoning** An equilateral triangle and an isosceles triangle share a common side as shown at the right. What is the measure of the vertex angle? Explain.

120; the congruent angles in the diagram both have a measure of 60. The base angles of the isosceles triangle have a measure of 30 because one is the other angle in a right triangle. The vertex angle must measure 120 if the base angles both measure 30.



Algebra Find the values of m and n .

17. 130; 105

18. 67.5; 45